

Claims

1. A device for the generation of pressure pulses, being intended for transmitting signals, in a fluid-carrying channel, in particular a drill string for sinking a deep well, comprising

a pulser designed to be placed in the channel and having a housing and an adjustable throttling device by means of which the flow resistance can be varied at least at one point of the channel,

an electrical generator having a stator and a rotor,

an impeller exposed to the fluid passing through the channel and designed to drive the rotor,

a control device by means of which the load of the generator can be varied in response to control signals, and

an actuating device that is connected to the throttling element and effects an adjustment of the throttling element responsively to the driving torque of the generator wherein

the impeller is axially movably mounted and yieldingly supported against the direction of fluid flow such that the supporting force of the yielding support increases as the axial movement of the impeller increases, and wherein

the throttling device includes an adjustable throttling element that is coupled to the impeller in such a way that the throttling element is adjusted in the sense of increasing the throttling effect by an axial movement of the impeller in the direction of fluid flow.

2. The device according to claim 1, characterized in that the impeller is fastened to an axially movable and rotatably mounted impeller shaft.

3. The device according to claim 2, characterized in that the impeller shaft is rigidly coupled to the rotor of the generator.

4. The device according to claim 1, characterized in that the yielding support of the impeller or the impeller shaft includes mutually repelling permanent magnets.

5. The device according to claim 1, characterized in that the yielding support includes a compression spring.

6. The device according to claim 5, characterized in that the supporting force of the compression spring is transmitted to the impeller or the impeller shaft by way of friction or antifriction bearings.

7. The device according to claim 1, characterized in that the impeller or the impeller shaft takes support upon a positioning device that generates an adjustable loading force directed against the supporting force of the yielding support.

8. The device according to claim 7, characterized in that the positioning device includes mutually repelling permanent magnets.

9. The device according to claim 7, characterized in that the positioning device is comprised of an axially adjustable axial bearing upon which the impeller or the impeller shaft takes support against the direction of flow of the impeller.

10. The device according to claim 9, characterized in that the axial bearing takes support on the positioning device by means of a compression spring.

11. The device according to claim 1, characterized in that the mutually opposing ends of the constructional unit comprised of the shafts of the impeller and the generator are each arranged in a compartment filled with a hydraulic medium, and that both compartments are interconnected by a throttling channel that penetrates the shafts in particular.

12. The device according to claim 1, characterized in that the generator includes two windings, a first winding for the electrical power requirement of a circuit and a second winding that is connected to the controlling device for the signal-dependent loading of the generator.

13. A device for the generation of pressure pulses, being intended for transmitting signals, in a fluid-carrying channel, in particular a drill string for sinking a deep well, comprising

a pulser designed to be integrated in the channel and having a housing and an adjustable throttling device by means of which the flow resistance can be varied at at least one point of the channel,

an electrical generator having a stator and a rotor,

an impeller exposed to the fluid passing through the channel and designed to drive the rotor,

a control device by means of which the load of the generator can be varied in response to control signals wherein

the impeller is axially movably mounted and yieldingly supported against the direction of fluid flow such that the impeller is moved axially in the direction of fluid flow on an increase in the driving torque of the generator, wherein

the impeller is arranged in an annulus of the housing that communicates with the channel on either side of the impeller, and provision is made on at least one side of the impeller for at least one radial opening that connects the annulus to the channel, and wherein

the impeller has a cylindrical sleeve that at least partly covers the radial opening during an axial movement of the impeller in the direction of fluid flow, thus causing the current of fluid entering through the radial opening to be throttled.

14. The device according to claim 13, characterized in that the annulus on either side of the impeller is connected to the channel by way of at least one radial opening.

15. The device according to claim 13, characterized in that the radial opening coverable by the sleeve is arranged on the outlet side of the impeller.

16. The device according to claim 13, characterized in that the impeller is fastened to an axially movable and rotatably mounted impeller shaft, and that the impeller shaft is rigidly coupled to the rotor of the generator, wherein the mutually opposing ends of the constructional unit comprised of the shafts of the impeller and the generator are each arranged in a compartment filled with a hydraulic medium and both compartments are interconnected by a throttling channel that penetrates the shafts in particular.

17. The device according to claim 13, characterized in that the generator includes two windings, a first winding for the electrical power requirement of a circuit and a second winding that is connected to the controlling device for the signal-dependent loading of the generator.